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ABSTRACT

A system of individually guided education (IGE), composed of seven motivation components designed to produce environments where individually guided educational practices can be introduced, has been developed to bring about major modifications in current elementary school educational practices. The organizational-administrative component -- the multiunit elementary school (MUS-E) -- is one of the more recently inaugurated components. The MUS-E emerged after 1965 from a synthesis of theory and practice regarding instructional programing for the individual student, horizontal and vertical organization for instruction, role differentiation, shared decisionmaking, and open communication. This report describes (1) the larger IGE system and where MUS-E fits into it, (2) the MUS-E and its developments and evaluations, (3) the development-evaluation procedures, and (4) the results of the MUS-E development and evaluation procedures. Related documents are EA 003 476 and EA 003 577. (Author/MLF)

Technical Report No. 158

THE DEVELOPMENT AND EVALUATION OF THE MULTIUNIT ELEMENTARY SCHOOL, 1966-1970

by
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Report from the Project on
Variables and Processes in Cognitive Learning

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STATEMENT OF FOCUS

The Wisconsin Research and Development Center for Cognitive Learning focuses on contributing to a better understanding of cognitive learning by children and youth and to the improvement of related educational practices. The strategy for research and development is comprehensive. It includes basic research to generate new knowledge about the conditions and processes of learning and about the processes of instruction, and the subsequent development of research-based instructional materials, many of which are designed for use by teachers and others for use by students. These materials are tested and refined in school settings. Throughout these operations behavioral scientists, curriculum experts, academic scholars, and school people interact, insuring that the results of Center activities are based soundly on knowledge of subject matter and cognitive learning and that they are applied to the improvement of educational practice.

This Technical Report is from the Project on Variables and Processes in Cognitive Learning in Program 1, Conditions and Processes of Learning. General objectives of the Program are to generate knowledge about concept learning and cognitive skills, to synthesize existing knowledge and develop general taxonomies, models, or theories of cognitive learning, and to utilize the knowledge in the development of curriculum materials and procedures. Contributing to these Program objectives, this project has these objectives: to ascertain the important variables in cognitive learning and to apply relevant knowledge to the development of instructional materials and to the programming of instruction for individual students; to clarify the basic processes and abilities involved in concept learning; and to develop a system of Individually Guided Motivation for use in the elementary school.

ACKNOWLEDGEMENTS

It is not possible to acknowledge the many individual contributors to IGE. However, in addition to the Center staff and cooperating educational agencies in Wisconsin are the local school systems of Janesville, Madison, Manitowoc, and Racine, and the Department of Public Instruction. /I/D/E/A/, an affiliate of the Kettering Foundation, has also been developing components of the IGE design.

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ABSTRACT

A system of individually guided education (IGE) has been developed at the elementary school level. The IGE system eliminates many ineffective practices that have survived throughout the past decades. The IGE system has seven components, one of which is new organizational/administrative arrangements, together called the "Multiunit Elementary School (MUS-E)." These new arrangements are the instruction and research unit at the classroom level (I & R unit), the instructional improvement committee at the building level (IIC), and the system-wide policy committee at the system level (SPC). The MUS-E emerged since 1965 from a synthesis of theory and practice regarding instructional programming for the individual student, horizontal and vertical organization for instruction, role differentiation, shared decision making, and open communication.

Since 1965-1966, 164 MUS-Es have been formed and there has been continuous evaluation of the effects of IGE. The organizational/administrative specifications dealing with specialization of tasks, cooperative planning and open communication among teachers and administrators, decision making at appropriate levels in the school system, high morale and job satisfaction among teachers, non-grading and continuous progress of students, and related phenomena have been met. Higher student achievement is occurring where the curriculum component in reading has been incorporated into smooth functioning MUS-Es. Early evaluation results indicate support of the hypothesis that children in the sixth year of schooling in an IGE/MUS-E school will achieve as high as did children of the same school in seven years prior to adoption of the IGE system.

INTRODUCTION

A system of Individually Guided Education (IGE) at the elementary school level has been developed through the systematic application of R & D strategies to the improvement of educational practice by the Wisconsin Research and Development Center for Cognitive Learning (R & D Center) and cooperating educational agencies. The IGE system has seven components, one of which is the multiunit elementary school (MUS-E), the organizational/administrative component. The MUS-E itself has three subcomponents, or elements. Evaluation of MUS-E has been carried out during each of the development years, starting in 1965-1966.

This report of the development and evaluation of the MUS-E parallels that for a report of an experiment and follows this sequence. First, the IGE system is described briefly to show how MUS-E fits into the system. Second, the MUS-E is described more fully to provide information about what is being developed and evaluated. Third, the development/evaluation procedures are described; these are analogous to the design of an experiment. Fourth, the development of the MUS-E elements and the results of the evaluation are given. Last, the report is summarized. Inasmuch as IGE and MUS-E represent major modifications from elementary education practices of the past decades, a substantial amount of space is given to their description. This is done at the expense of reporting the related research and theorizing of others and also the details of the development and the successive evaluative studies completed at the Center.

A system of Individually Guided Education is a comprehensive system of education and instruction designed to produce higher educational achievements through providing well for differences among students in rate of learning, in learning style, and in other characteristics. IGE is more comprehensive than individualized instruction when individualized instruction is viewed as instruction in which a student learns through interacting directly with instructional materials or equipment with little or no assistance from a teacher. In IGE self-instructional materials or systems are simply one important kind of instructional material or medium to be used in instructional programming for the individual. The major components of IGE are as follows:

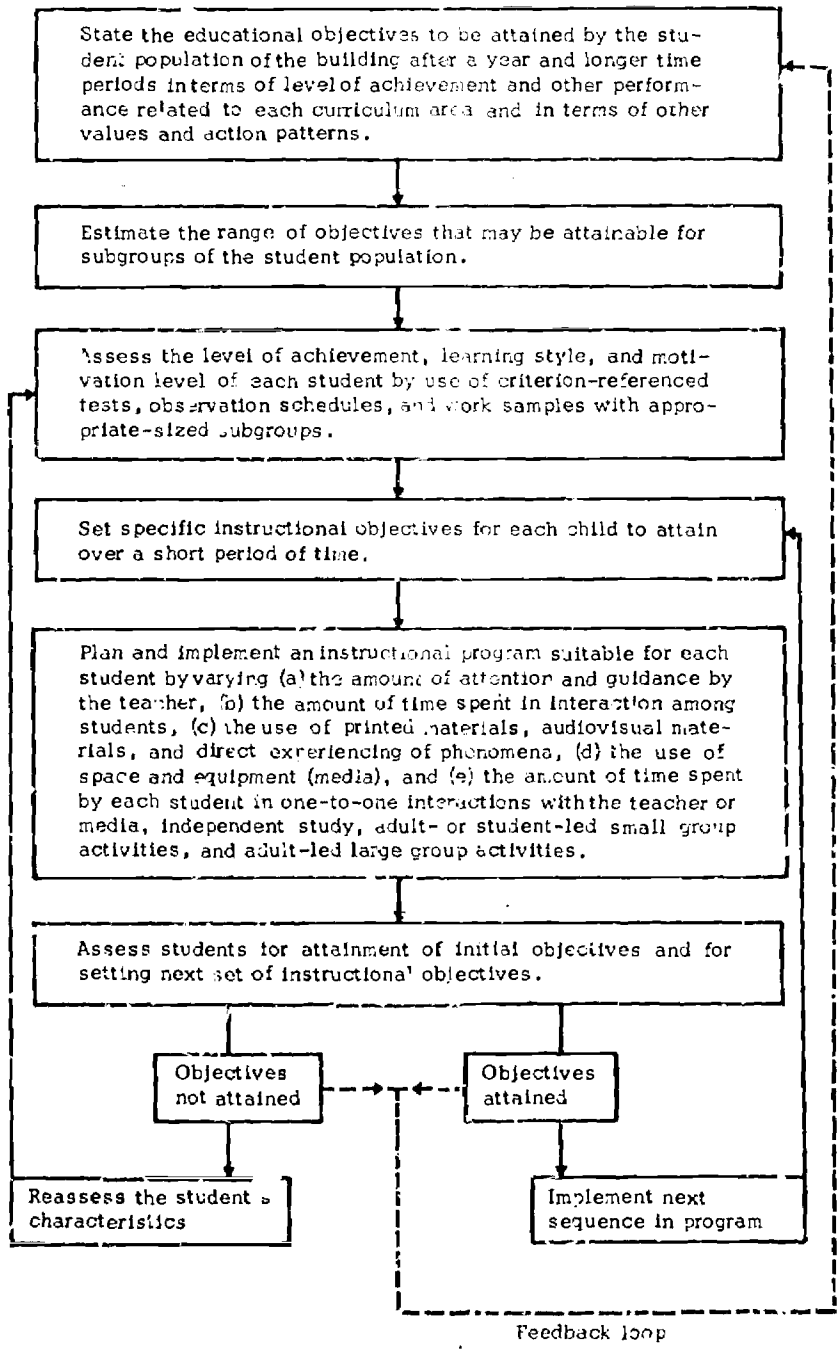
1. An organization for instruction and a related administrative organization at each the building and central office level, collectively called the MUS-E. This organizational/administrative arrangement is designed to provide for educational and instructional decision making at appropriate levels; open communication among students, teachers, and administrators; and accountability by educational personnel at various levels. An inservice educational program, including multimedia materials, has been developed.

2. A model of instructional programming for the individual student, and related guidance procedures, designed to provide for differences among students in their rates and styles of learning, level of motivation, and other characteristics and also to take into account all the educational objectives of the school. This model is shown in Figure 1 and is used by Center personnel in developing curriculum materials and by school staffs in implementing IGE.

3. Curriculum materials, related statements of instructional objectives, and criterion-referenced tests which can be adopted or adapted by the staff of individual schools to suit the characteristics of the students attending the particular school. There is a shortage of these materials at present. The Center in 1970-1971 was developing

Figure 1

Instructional Programming Model in IGE



materials in reading, prereading, mathematics, environmental education, and motivation.

4. A model for developing measurement tools and evaluation procedures including preassessment of children's readiness, assessment of progress and final achievement with criterion-referenced tests, feedback to the teacher and the child, and evaluation of the IGE design and its components. This model can be used by school people and others in developing their own instruments and procedures. Tests to go with Center-developed curriculum materials are being developed according to this model.

5. A program of home-school communications that reinforces the school's efforts by generating the interest and encouragement of parents and other adults whose attitudes influence pupil motivation and learning.

6. Facilitative environments in school buildings, school system central offices, state education agencies, and teacher education institutions. Helpful in producing these environments are: (a) a staff development program which includes inservice and campus-based educational programs to prepare personnel for the new roles implied by the other components outlined above; (b) state networks comprised of the state education agency, local school systems, and teacher education institutions to demonstrate, install, and maintain IGE schools and components; and (c) within-state leagues or other networks of local school systems and support agencies to generate new ideas and secure consultant help. The Center in 1970-1971 was developing these elements cooperatively with other agencies. In addition, each school building must have its own staff development program in order for IGE to be implemented initially and improved thereafter.

7. Continuing research and development to generate knowledge and to produce tested materials and procedures. The primary elements here are development and development-based research to refine all the IGE components and research on learning and instruction to generate knowledge that will lead to improved second generation components or their replacements. The Center is engaged in these efforts. Each school building must engage in practical research in order to design, implement, and evaluate instructional programs for individual students.

THE MUS-E ORGANIZATIONAL ARRANGEMENTS

The MUS-E was designed to produce an environment in which IGE practices can be introduced and refined. It may be regarded as an invention of organizational and management arrangements that have emerged since 1965 from a synthesis of theory and practice regarding instructional programming for individual students, horizontal and vertical organization for instruction, role differentiation, school decision making by groups, and open communication. Space does not permit tracing the historical antecedents of each of these; however, the Center and school personnel attempted to bring together the available research and theory in the formulation of the MUS-E.

Figure 2 shows the prototype organization of a MUS-E of 600 students.[1] The organizational hierarchy consists of interrelated groups at three distinct levels of operation: the I & R unit at the classroom level, the IIC at the building level, and the SPC or a similar administrative arrangement at the district level. Each of the first two levels is itself a hierarchical structure with clearly defined roles for personnel. The MUS-E is designed to provide for responsible participation in decision making by all the staff of a school district. Each element, though taking initiative for certain decisions, secures information from one or both of the other elements in order to make wise decisions. Personnel who serve at each of two levels, as noted in Figure 2, provide the communication link.

THE I & R UNIT

The nongraded I & R unit replaced the age-graded, self-contained classroom. Research is included in the title to reflect the fact that

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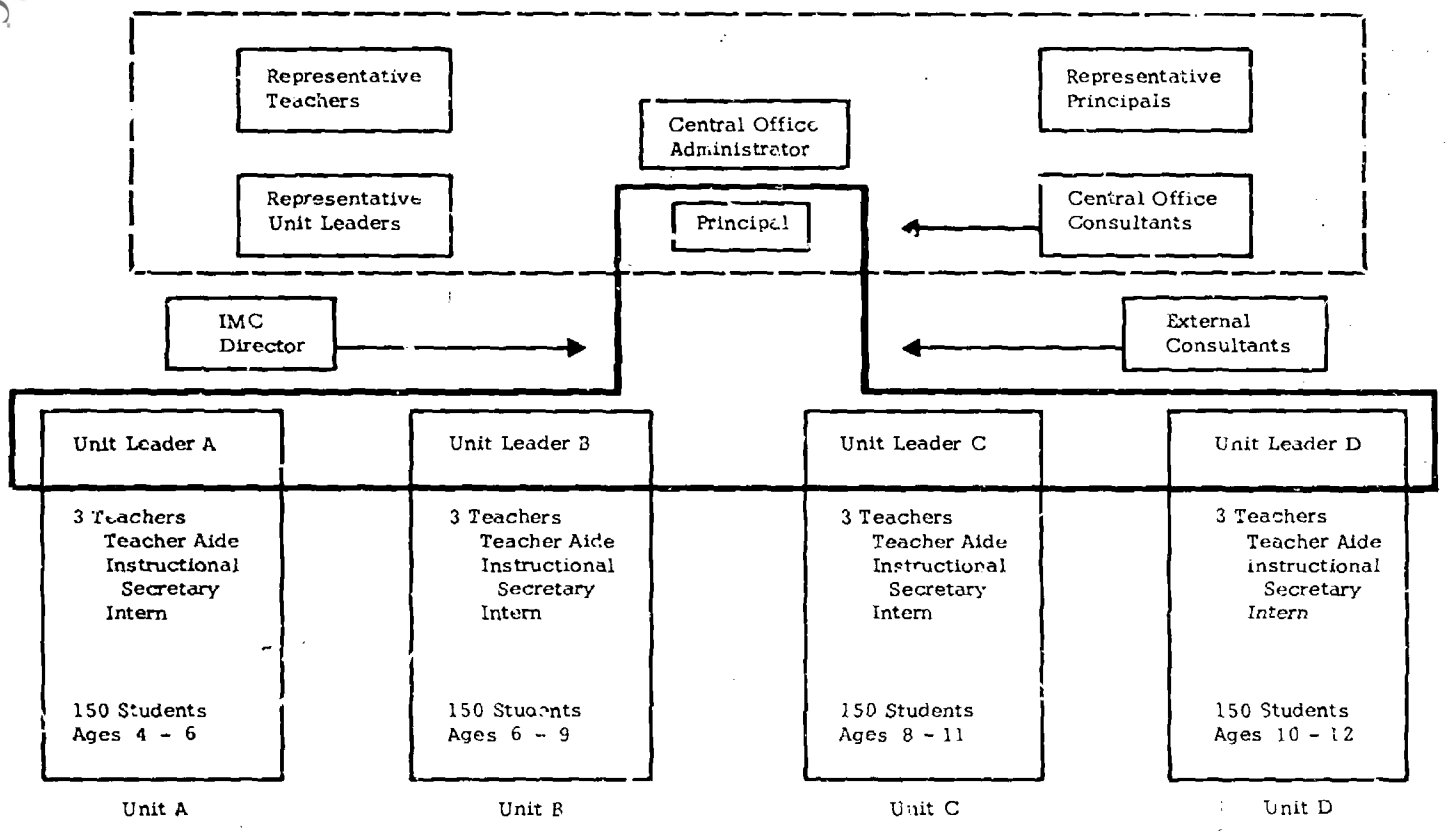
[1] A more complete description is given in Herbert J. Klausmeier, Richard Morrow, and James E. Walter. Individually Guided Education in the Multiunit Elementary School: Guidelines for Implementation. Madison, Wis.: Wisconsin Department of Public Instruction, 1968.

Figure 2

ORGANIZATIONAL CHART OF A MULTIUNIT SCHOOL OF 600 STUDENTS



——— Building Instructional Improvement Committee

– – – System-Wide Policy Committee

the staff must continuously do practical research in order to devise and evaluate an instructional program appropriate for each child. In the prototype shown in Figure 2, each I & R unit has a unit leader, or lead teacher, three regular staff teachers including a resident, or first-year teacher, one teacher aide, one instructional secretary, one intern, and 150 students. Actual practices vary from the prototype to take into account local conditions.

The main function of each unit is to plan, carry out, and evaluate, as a hierarchical team, instructional programs for the children of the unit. Each unit engages in some on-the-job inservice education. Some units plan and conduct research and development cooperatively with other agencies, and some are involved in preservice education.

The instructional program for individual students is planned and carried out by the unit staff cooperatively. Similarly, developing instructional methods and materials or carrying out a research project are cooperative activities. The unit usually has consultants from the central office or elsewhere to assist staff members with planning.

THE IIC

At the second level of organization is the building IIC, a new organization that became possible in 1967 when the first entire school buildings were organized completely into units. As noted in Figure 2, the prototypic IIC is comprised of the building principal and the unit leaders. Other building staff, such as the director of the instructional materials center, meet regularly with the IIC, as does the responsible consultant from the central office when a curriculum area such as reading or mathematics is given special attention in the building. The IIC meets weekly and acts on an agenda formulated by the principal in consultation with the unit leaders.

The four main functions for which the IIC takes primary initiative are stating the educational objectives and developing the educational program for the entire school building; interpreting and implementing district-wide and state-wide policies that affect the educational program of the building; coordinating unit activities to achieve continuity in all curriculum areas; and arranging for the use of facilities, time, material, etc., that the units do not manage independently. The IIC thus deals primarily with development and coordinating functions related to instruction.

THE SPC

Substantial changes are required to move from the self-contained classroom concept to that of the unit and the IIC. The SPC, at the third organizational level, was created to facilitate this transition. As noted in Figure 2, the prototype committee, chaired by the superintendent or his designee, includes consultants and other central office staff and representative principals, unit leaders, and teachers. The SPC meets less frequently than either of the other groups, but its operation is important for the success of the MUS-E. Its members are selected in terms of specialized knowledge and decision-making power essential to the success of the MUS-E of the system. Four decision-making and facilitative responsibilities for which the SPC takes primary initiative are identifying the functions to be performed in the MUS-Es of the system, recruiting personnel for each school and arranging for their inservice education, providing instructional materials, and disseminating relevant information within the system and community. A central office arrangement other than an SPC may be responsible for these functions; considerable flexibility is required since local school districts differ greatly in population.

DIFFERENTIATED ROLES

Unlike some differentiated staffing programs that create a complex hierarchy and call for a proliferation of new roles and titles for personnel, the MUS-E establishes only one new position, that of unit leader or lead teacher.[2] Other roles that are changed somewhat are those of the building principal, staff teacher, first-year teacher or resident, teacher intern, teacher aide, and instructional secretary. The MUS-E pattern does not preclude

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[2]The staffing pattern is described more fully in H. J. Klausmeier and R. J. Pellegrin, "The Multiunit School: A Differentiated Staffing Approach," in D. S. Bushnell and D. Rappaport (Eds.), Planned Change in Education: A Guide to Systems Application. New York: Harcourt, Brace and Jovanovich, Inc. (In press)

the identification and establishment of other new, specialized roles, such as those connected with instructional media or neighborhood relations. It does assume, however, that the lead teacher and the staff of the unit who work directly with the children and their parents are the key individuals in the instructional system. Further, it calls for a heavy and direct concentration of monetary resources and personnel in the daily program of instruction, rather than in supplementary services outside the regularly scheduled school day.

DEVELOPMENT-EVALUATION PROCEDURES

The R & D Center evaluates the effectiveness of its prototype programs, materials, and procedures during the development process in terms of the prototype meeting specified criteria related to its objectives.[3] For example, both ability and norm-referenced achievement tests are revised until they meet specified criteria of validity, reliability, and usability.

The development operations follow this sequence.[4] First, changes in school conditions that will promote more effective learning, living, and achieving by the children and the school staff are identified cooperatively with the staff of the school systems affiliated with the R & D Center. Second, the means and materials for improving the unsatisfactory conditions are described by the Center staff in terms of the specifications for a prototype that will be developed. The specifications include a general description of the prototype, a statement of its objectives in terms of performances anticipated, a description of the target population for which it is intended, a description of the conditions under which it is to be used, an estimate of its cost, and an approximation of its effectiveness in comparison with existing conditions. Third, the prototype is developed. It takes the form of a description of a procedural output, such as an organization for instruction or a model of instructional programming for the individual student; whereas the prototype of a test, book, or piece of equipment is the best approximation of the final product. The prototype is developed according to the specifications and simultaneously put into practice in a few school buildings. As early as feasible it is installed in other schools to assure its effectiveness and usability on a larger scale. Fourth, as the prototype comes nearer to achieving the specified objectives with the described target populations under the described conditions, it is field tested; that is, it is installed, tested, and evaluated in a larger number of buildings of representative large, medium-sized, and small school systems. Finally, arrangements are worked out by the Center for the production, installation, and maintenance of the final product, including inservice instructional programs, based on the prototype. Non-profit and profit-making agencies, including publishers, assume this final responsibility.

Evaluation of the prototype is carried out at Points 2, 3, and 4 in the preceding sequence in terms of the specifications established at the outset. Revisions of the prototype may occur at any point, thus the development-evaluation sequence is iterative. At the same points three means of evaluation are used; namely, expert review to deal with substantive and theoretical matters, consumer review to deal with substantive and feasibility concerns, and empirical quality verification to ascertain the extent to which the criteria are met and at what cost. Center personnel and members of the Center's various review teams provided the expert judgments while school personnel in the cooperating MUS-E schools provided the consumer opinions.

Several procedures, the results of which are reported in the next section, were followed in connection with the empirical quality verification of MUS-E and other IGE components. Observations were made each year of I & R operations and later of IIC operations to ascertain the extent to which the emerging organizational and instructional specifications were being attained. The observational information provided corrective feedback informatio

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[3] Helpful information concerning the development and evaluation of tests and curriculum materials is found in American Psychological Association, Standards for Educational and Psychological Tests and Manuals. Washington: American Psychological Association, 1966; and Louise Tyler, M. Frances Klein, and William B. Michael. Recommendations for Curriculum and Instructional Materials. Los Angeles: Tyl Press, 1971.

[4] See H. J. Klausmeier and G. O'Hearn (Eds.), Research and Development Toward the Improvement of Education. Madison, Wis.: Dembar Educational Research Services, 1968, for further information about development strategies.

to the Center and school personnel. Also, the feasibility of MUS-E was established. Explicitly stated performance criteria were eventually developed and used in 1970-1971.

Structured interviews and questionnaires were used with the personnel of three MUS-Es and three control schools in 1967-1968 to ascertain the extent to which the organizational/administrative objectives were being attained.

Center-developed, criterion-referenced tests in reading became available in 1968-1969 and were administered to the children attending two MUS-E schools before the Center-developed prototype reading program was introduced. The Center then administered forms of the same tests the following year and noted the extent to which a greater number of objectives were attained in the same length of time. Thus, the student body that had not experienced the new program served as a control group for students who later experienced the program. Inasmuch as the objectives of the prototype reading program are similar to those of the prior programs in these two schools, a comparison of the effects of the Center program and the other programs was made through the use of non-Center-produced standardized tests.

Information was gained to ascertain the extent to which I & R unit personnel could carry out development and research activities through conducting controlled experiments and development activities within the early I & R units. In the experiments new individualization procedures were developed cooperatively with Center personnel and compared for a few weeks to a year with a procedure already in practice. Students' mean achievements as measured by standardized tests and also other desired behaviors were noted. Cost of the MUS-E has been estimated only in terms of pupil-teacher ratio. A more definitive means of assessing costs in terms of units of student achievement is still under consideration.

The development-evaluation procedures just outlined resulted in only one test output, each extension and refinement of which was judged to be increasingly effective with the particular target population. A different preferred strategy would have resulted in the simultaneous development and testing of at least one other organizational/administrative pattern. The funding level of the Center did not sufficiently support this more costly approach.

RESULTS OF THE FORMATIVE EVALUATION, 1966-1970

The inservice and on-campus education programs for IGE/MUS-E personnel are under development; therefore the evaluation has been conducted when personnel were learning their new or changing roles. Also, the various elements of MUS-E are still under refinement. Despite these limitations a massive amount of information has been collected and reported each year. Representative information is summarized according to the following pattern. First, the formation and expansion of I & R units and MUS-Es according to implementation guidelines are described. This information indicates the feasibility of MUS-E as a replacement for existing practices. Second, the effectiveness of the MUS-E in achieving specified communication, decision making, and related objectives is described. Third, the introduction of the IGE reading component into MUS-Es is described and the effectiveness of the two combined components in attaining specified curricular objectives is indicated. Fourth, the benefits of the MUS-E in relation to costs are estimated.

FEASIBILITY

Performance criteria by which information gathered can be related when making judgments about effectiveness have been developed for the SPC, IIC, and I & R unit. These are statements that describe the previously listed functions of each element explicitly and in detail. Three criteria dealing with instructional responsibilities are:

1. The SPC reviews the broad objectives and building plans for implementation of IGE in the various curriculum areas.

2. The IIC annually formulates a statement of educational objectives that indicate the terminal performances projected for groups of students of specified characteristics.

3. The I & R unit staff identifies instructional objectives for each student.

These criteria imply that the MUS-E should be feasible; that is, it should be sound in conception and also practical in terms of anticipated benefits in relation to money and time expended. Further, it must be adaptable to conditions in a variety of local school settings.

Table 1 presents information regarding MUS-E elements in Wisconsin for each year, 1965-1966 through 1970-1971, and also the estimated number of MUS-Es in other states. Several observations regarding the data in Table 1 are warranted. First, the number of

Table 1

Multiunit Elementary Schools: 1965-1970

Year	No. I & R Units	No. Schools in Wis.	No. Wis. Schools with IICs	No. Wis. School Systems Involved	No. Out of State Schools
1965-66	13	10	--	4	--
1966-67	23	14	--	6*	--
1967-68	30	9	6	4	--
1968-69	55**	21	8	9	3**
1969-70	139	51	26	23	35**
1970-71	283	99	65	49	65**

*Two systems with 3 MUS-Es temporarily discontinued unit operations, but reinstated them in succeeding years; in a third system, 2 MUS-Es were discontinued.

**Estimated. Exact figures not available.

I & R units and the number of schools with functioning IICs has about doubled each successive school year, starting with 1967-1968. Second, there was some attrition between 1966-1967 and 1967-1968, primarily because the organization of entire schools in the multiunit pattern in the 1967-1968 school year was accomplished in some instances by transferring unit personnel from various buildings to the multiunit building. In the process some units reverted to self-contained classrooms. Two school systems which dropped five units from the program in 1967-1968 later reinstated them and in 1970-1971 were operating several MUS-Es.

The installation of the MUS-Es was accelerated in the 1968-1969 school year when the Department of Public Instruction (DPI) of Wisconsin assumed responsibility for the statewide demonstration-installation- and maintenance of MUS-Es.

The Superintendent of the Department of Public Instruction in Wisconsin indicated the feasibility of the MUS-E thus:

> After careful consideration of various programs being offered throughout the nation today, we have selected the multiunit school, developed by the Research and Development Center for Cognitive Learning, University of Wisconsin, as having the greatest promise as a facilitative environment for improving learning opportunities at the elementary school level. This design meets all the criteria considered necessary if desired improvement is to be achieved. Within the unit structure provided, both the instructional and learning components support effective use of time, talent, and effort. Roles are differentiated and opportunities are provided for planning, sharing, and evaluation. Provision is inherent in the design to encourage cooperative effort in teacher education and research activities at the local educational level.[5]

Sixteen teacher-education institutions cooperated with the DPI in the installation effort in 1970-1971. Also in 1970-1971 the Institute for Development of Educational Activities (/I/D/E/A/), an affiliate of the Kettering Foundation, started a broad-scale installation-maintenance effort. /I/D/E/A/

[5] The quotation is taken from a major address of William Kahl, Superintendent, Department of Public Instruction, Madison, Wisconsin.

provided inservice multimedia materials in Wisconsin and also took initiative for starting MUS-Es in Colorado. As a result of these efforts, about 5% of the elementary schools in Wisconsin had become MUS-Es by 1970-1971.

Observations made in the MUS-Es indicate that I & R units are meeting their operational and instructional performance criteria reasonably effectively. There is substantial variability among units. Some have ineffective unit leaders and an occasional unit has an uncooperative staff teacher. The majority of IICs are functioning reasonably well but more IICs than units are experiencing difficulty. Some principals yet lack small-group management skills and have not learned to utilize the strengths of capable unit leaders.

No clear pattern has emerged concerning the effectiveness of SPCs. Most school systems are using existing administrative arrangements for decision making at the central office level. The role of the central office subject-matter consultants in working with building personnel remains unclear in some school systems. Difficulties are encountered in three areas: decision making about the adoption and use of textbooks and tests, the leadership of the central office in curriculum improvement through supervision, and salary and working conditions as organized teachers become more assertive in their collective negotiations.

Aware of these and other difficulties which call for continuing refinement of the system and related practices, the National Evaluation Committee of the R & D Center which has met annually with the staff of the Center since 1965 expressed these ideas about the MUS-E in its 1970 report concerning the Center:

> The Committee wishes to reiterate its strong support of the multiunit school and individualized instruction and will here note the salient features provided by this unusual combination of educational and organizational concepts:
>
> 1. Attention is focused on the individual learner as a person with unique characteristics, concerns, and motivations.
>
> 2. Teachers and other educational personnel are helped to employ systematic problem-solving processes to the identification and satisfaction of the educational needs of individuals —both in the student body and on the staff.
>
> 3. The basic organizational units are small enough to allow every person to be known and treated as an individual and large enough to permit role differentiation and complementarity of contributions.
>
> 4. Provisions for staff training and continuing development are an essential part of the approach.
>
> 5. There is a good reconciliation of the values of autonomy and accountability, small group responsibility, and inter-group coordination.[6]

ATTAINING ORGANIZATIONAL OBJECTIVES

Four performance criteria for I & R units and the IIC call for specialization of work by the instructional staff related to curriculum and instruction, working relationships among the members of the instructional staff and the building principal characterized by dependent relations and cooperation among teachers and between the building principal and the teachers, decision making about instructional and other matters characterized by less independence by individual teachers and the building principal and more shared responsibility by the I & R unit and by the IIC, and acceptance by teachers of the IGE objectives of providing for differences among students in rate and style of learning. Related to these objectives, the Center for Advanced Study of Educational Administration at the University of Oregon began a longitudinal study in 1967-1968 in which data were collected in a MUS-E and a control school in each of three Wisconsin school systems. These MUS-Es were completing their initial year under the MUS-E pattern. The

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[6] From p. 6 of the Minutes of the National Evaluation Committee, Madison, Wisconsin, November 11-13, 1970. Francis Chase, Emeritus Professor, University of Chicago; George E. Dickson, Dean, College of Education, University of Toledo; and Roderick F. McPee, President, Punahou School, Hawaii, are the NEC Committee members primarily responsible for the evaluation of the MUS-E. Benton J. Underwood, Northwestern University, chairs the Committee.

data therefore indicate the kinds of changes that occurred during the first year of adopting the MUS-E pattern. Only the main conclusions of Pellegrin follow.[7]

Task Structure and Specialization

Three significant differences between the teachers in MUS-Es and the control schools were found in connection with how they described their jobs:

1. Most MUS-E teachers listed duties that were tied to the achievement of specified instructional objectives, mentioning sets of tasks that were less global and amorphous than those frequently given by control school teachers.

2. There was a superior recognition among MUS-E teachers of the vital role planning plays in instruction; the five most important tasks of MUS-E teachers dealt with specific types of planning and the preparation of instructional materials.

3. A far larger proportion of tasks of MUS-E teachers than of control school teachers consisted of planning and supervisory tasks that involved the coordination of their work with that of other personnel.

New and novel kinds of specialization of labor emerged in the MUS-Es. Three main types were identified:

1. Some teachers devoted most of their time to working with individual pupils, others worked mainly with small groups or class-sized groups; a few took responsibility for working with even larger groups.

2. Teachers served as expert advisors to their colleagues, particularly when a teacher had special training in a particular curriculum area.

3. Specialization occurred in connection with special assignments, for example, some teachers assumed the main responsibility in the unit for planning instructional sequences.

Working Relationships

Pellegrin charted interdependence relationships in the three MUS-E and the three control schools. Space permits only the inclusion of the chart for one MUS-E. Figure 3 shows the interdependence relationships among the principal, teachers, clerical aides, and instructional aides in a MUS-E with five I & R units. (A solid line indicates an essential relationship whereas a dotted line indicates a dependence relationship that is not essential.)

As may be observed, the unit leaders were the focal points of interaction in the units, and also served as the connecting links between the teachers and the principal. The principal received nominations from most teachers and from all of the unit leaders. For three of the five unit leaders, an essential relationship was seen with the principal. Only three teachers, however, viewed their relationships with the principal as essential. The units had been fairly successful in incorporating non-professional aides into the unit as shown in Figure 3.

Pellegrin (1969), after drawing comparisons between the MUS-E and control schools, concluded:

> The fact is that the traditionally organized elementary school in the United States has a primitive division of labor and differentiation of functions in its professional staff. Grade level is the only consistent basis for distinguishing among teachers. Emphasis is on the functions universally performed by teachers, not on the coordination of effort or any form of specialization.

THE DECISION-MAKING STRUCTURE

In the three self-contained schools, decision making affecting each classroom was the prerogative mainly of two individuals—the teacher, serving as a primary decision maker, and the principal, who provided advice or set the limits within which the teacher had discretion. Few teachers saw themselves as involved in group decision making of any kind with regard to any of these items. In the

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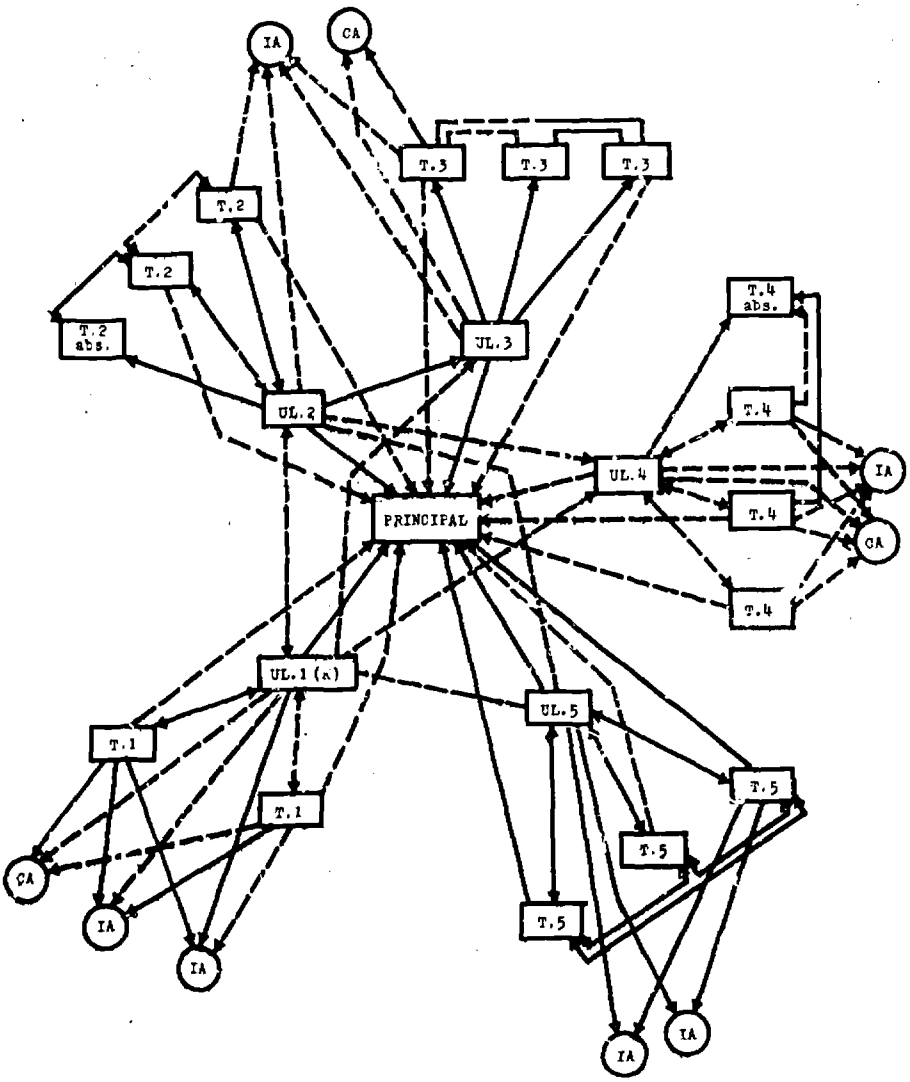
[7] For a more comprehensive discussion, see Roland J. Pellegrin, Some Organizational Characteristics of Multiunit Schools, Working Paper No. 22. Madison, Wis.: Wisconsin Research and Development Center for Cognitive Learning, 1969. Also published as Technical Report No. 8, The Center for the Advanced Study of Educational Administration, University of Oregon, 1970.

Figure 3

Expanded Interdependence Relationships in a Multiunit School



three MUS-Es a notable shift away from reliance on the principal for advice and assistance to a situation in which colleagues serve such a function was observed. Also, decision making was moving from the level of the individual classroom to that of the unit. Decisions were generally made by the unit leaders and teachers in a group setting.

Operational Goals

Appreciable changes had also occurred in the operational work goals which teachers set for themselves. Representative of the change was the fact that in the MUS-Es, "giving individual attention to students" and "diagnosing learning problems of students" ranked first

and second in importance. In contrast, teachers in the control schools ranked "insuring that students learn basic skills" first, followed by "developing student ability in analytical reasoning and problem-solving."

Job Satisfaction

Sharp differences between the teachers in the MUS-Es and control schools in attitudes toward their work and work environment were identified. Seven of 10 items of a job-satisfaction scale, together with the proportions of MUS-E and control teachers responding "highly satisfied" are as follows: satisfaction with progress toward one's personal goals in present position, 26% and 15%; satisfaction with personal relationships with administrators and supervisors, 61% and 39%; opportunity to accept responsibility for one's own work or the work of others, 61% and 43%; seeing positive results from one's efforts, 36% and 15%; personal relationships with fellow teachers, 73% and 55%; satisfaction with present job in light of one's career expectations, 56% and 39%; and the availability of pertinent instructional materials and aids, 60% and 27%. These differences all favor the MUS-E teacher; responses to the other three items were not significantly different. Thus job satisfaction was high among the staff teachers of the units.

STUDENT ATTAINMENT OF INSTRUCTIONAL OBJECTIVES

The performance criteria for an IGE/MUS-E school call for programming for the individual student to be fully implemented in at least one curriculum area by the end of the first year of operation. Based on results in I & R units when the Center provided substantial weekly input during the early years, the Center hypothesized that children in the sixth year of attending an IGE/MUS-E school, including Kindergarten as one of the years, would achieve as high as children in the seventh year in the same school did prior to adoption of the IGE system. As of 1970-1971 some children were in their fourth year in a MUS-E school; however, the first supportive IGE curriculum area, reading, was not introduced until the students were in their third year.

The Wisconsin Design for Reading Skill Development (WDRSD), under development and quality verification by the R & D Center, includes a Word Attack program in which 45 subskills have been identified, the mastery of which is presumed to lead to independence in attacking phonetically regular words. Group-administered assessment procedures have been developed for each subskill and machine-scorable group tests have been developed and validated for 38 of the 45 subskills. Reliabilities of the tests range from .69 to .94; 26 of the 38 have reliabilities above .80. Only 3 are lower than .75. The group tests were organized into Levels A, B, C, and D; the number of skills measured at each level are 7, 13, 16, and 7, respectively. Subtests from two of the levels may be administered to the same child.

In the 1969-1970 school year the Word Attack element of the WDRSD was used at the primary level in two smoothly functioning MUS-Es in their third year of operation. The Word Attack program is designed for the first four years including Kindergarten, and it is presumed that about 75% of all children enrolled in American schools will have mastered all the skills toward the end of their fourth year. The group tests were administered in September, 1969, when the reading program was initiated, to three groups of pupils in both schools beginning their second through fourth years of school and again in September, 1970, to the same groups at that time beginning their third through fifth years. The gains made by the three groups as measured by the successive administration of the group tests are shown in Table 2. The median number of objectives attained by the three groups were 8, 19, and 11 respectively. Thus, the skills were relatively difficult for the first group and easy for the second group. The median for the third group reflects the fact that some children had already mastered some of the skills in the Level D battery at the beginning of their fourth year of school, equivalent to the Third Grade

It was also possible to ascertain the percent of children in the two schools who had mastered the various skills as measured by the same level of the test battery before the reading program was introduced and also the percent of children who had experienced the program for one year. [The batteries were not administered in 1969-1970, however, to beginning first-year or Kindergarten children, or to beginning fifth-year or Fourth Grade children.] It should be noted that both schools made a special attempt to carry out excellent instruction in reading before the WDRSD was introduced. The percents for the baseline groups (B2, B3, and B4) and for the groups who had experienced the program (Ex 2, Ex 3, and Ex 4) are given in Table 3. It may be properly inferred that Groups B2 and Ex 3 and B3 and

Table 2

Distribution of Skills Mastered and Retained by Three Groups of Children During 1969-1970 School Year

Year in School in Sept. 1970	Number of Skills Mastered									Median
	0-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	24---	
Third *N = 98	13	21	24	26	11	1				8
Fourth *N = 87	3	4	4	3	10	13	22	1	27	19
Fifth *N = 96	27	10	6	24	24	5				11

*Numbers are smaller than in Table 3 because only those remaining in school one academic year and who were in school attendance during the week of testing could be included.

Ex 4 include the same children who were in attendance at the same school for the 2 successive years and who were present for both test administrations during the month of September. A higher percent of the experienced children, in comparison with the baseline children, achieved mastery of 23 skills, fewer mastered 6 skills, and an equal percent mastered one skill. Revised tests were used in 1970 on two of the six skills where the 1970 groups showed lower mastery. In general, mastery by the 1970 groups was substantially higher than by the 1969 groups except in the second year of schooling, equivalent to the First Grade in a traditional school. The relatively lower mastery here is attributable to the fact that the new reading program was not introduced for most children until late in the first, or Kindergarten, year and then only to those manifesting positive behaviors indicative of reading readiness.

Table 3

Percent of Baseline Nonexperienced and Experienced Children who Mastered Various Reading Skills

Group and year	N	Skill Number																	Median
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
B2: 1969	134	48	63	79	94	65	*	30												64
Ex 2: 1970	107	62	52	79	97	66	*	37												64
B3: 1969	105	26	*	74	43	58	*	32	6	40	13	21	55	24						32
Ex 3: 1970	117	51	*	68	66	66	*	27	34	35	20	32	48	58						48
B4: 1969	113	67	17	82	63	23	46	31	*	*	*	*	58	46	76	44	11	*	48	46
Ex 4: 1970	100	83	35	85	76	58	63	51	*	*	*	*	70	65	56	61	45	*	62	62

*Group tests had not yet been developed for these skills in 1969.

The Doren Diagnostic Reading Test measures achievements similar to those implied by the objectives of the WDRSD. Two schools administered this test to baseline and experienced groups of children toward the end of their third year (Second Grade) of schooling in May 1969 and in May 1970. The results in terms of mean total scores and mean subtest scores are shown in Table 4 for each of the two groups in each school. The higher mean total scores of 3.1 in School A and 6.3 in School B are statistically significant at about the .20 and the .01 levels, respectively. It is interesting to note also the slightly higher mean scores on nearly all the subtests. As may be observed in Table 4, the mean scores of the children in School A were considerably higher than in School B, and on only four of the nine subtests could the scores of the experienced children in School A have been much higher than the scores of the baseline children. There was thus relatively less opportunity for the experienced group in School A to make higher scores. The smaller number of pupils in 1970 in both schools reflects simply year-to-year fluctuations in age/grade level enrollment in comparison with 1969.

In the initial years of unit operations prior to 1968, the design for instructional programming for the individual was less completely

Table 4

Mean Raw Scores of Baseline and Experienced Groups of Third-Year Children in Two Schools on the Doren Diagnostic Test in May 1969 and May 1970

	School A			School B		
Subtest	Baseline May 1969	Exper. May 1970	Diff.	Baseline May 1969	Exper. May 1970	Diff.
Letter Recognition (10)*	9.1	8.9	.2	8.2	9.1	.9
Beginning Sounds (10)	8.8	8.8	0.0	8.4	8.7	.3
Word Recognition (15)	14.6	14.6	0.0	14.2	14.6	.4
Speech Consonants (5)	4.3	4.5	.2	4.4	4.5	.1
Ending Sounds (15)	11.3	11.5	.2	9.7	10.6	.9
Blending (10)	7.1	8.2	1.1	6.9	7.4	.5
Rhyming (10)	5.5	6.2	.7	4.9	5.3	.4
Vowels (25)	18.7	20.3	1.6	16.2	18.6	2.4
Homonyms (5)	3.9	4.0	.1	3.8	4.2	.4
Total Score (105)	83.4	86.5	3.1**	76.7	83.0	6.3***
N	112	104		95	87	

*Indicates total number of items in the subtest.
**Significant at about the .20 level.
***Significant at the .01 level.

conceptualized and no curriculum components had been developed specifically for IGE/MUS-E. Each unit, working with an R & D Center consultant, developed or did research on an innovative practice. Representative activities wherein some form of individualizing of instruction was done and information on pupil achievement was secured are summarized in Table 5. In general, the individualized experimental treatments often resulted in dramatically higher achievement than did the traditional approach, and the control groups improved more than might have been expected in the time interval. However, the difference between the experimental and control groups was usually not statistically significant at the .05 level. It should be noted that the unusually high gains of the control groups probably result from communication among pupils or failure of teachers to adhere to the specified control treatments. While these large gains would not likely be maintained over an extended number of school years, small but consistently higher gains of about 20% each year would result in attaining the hypothesized level of achievement as stated earlier.

The preceding results based on criterion-referenced and standardized tests indicate the desirable combined effects of the multi-unit organization and a concerted attack on curriculum improvement along the IGE model. This is not to be interpreted that the organization alone will produce higher student achievement or that higher achievement will accrue without a coordinated, well-planned curriculum improvement effort. In a MUS-E of one school system, student achievement in some curriculum areas as measured by standardized tests was relatively poor; the unit leaders and building principal were unable to produce a facilitative environment.

COST BENEFITS

A satisfactory procedure for determining the costs of instruction in terms of units of student achievement has not been identified. However, data are being collected by some school systems to assess costs in terms of pupil-teacher ratio and this information is made available on request to the Center. As of 1970-1971 most MUS-Es were on the same pupil-teacher ratio as the other schools of the local school system. Further, formulas have been developed in the school systems for determining the equivalents of instructional aides, clerical aides, and teaching interns in terms of certified teachers. Thus, the pattern in Wisconsin is to operate a MUS-E at little or no increase in cost. The Center recommends, however, one additional aide per I & R unit during the first year or two and also an increase of about ten dollars per pupil for instructional material. Further, the Center recommends a higher salary for the lead teacher than that for a staff teacher with equivalent experience and education. This recommendation appears to be acceptable to the state and local education associations of Wisconsin, provided the lead teacher position is defined as a "teacher" and the higher pay is not used to weaken the tenure rights of the lead teacher or to introduce merit as the criterion for teacher salary increments. The school boards of the school systems with which the Center works closely have written the higher salary into their master contracts.

SUMMARY

IGE has evolved over a 6-year period with the organization-administration elements conceptualized and introduced first. There were 13 I & R units in 10 school buildings in Wisconsin in 1965-1966; in 1970-1971 there were 283 units in 99 MUS-E schools in Wisconsin, and an estimated 65 MUS-Es in other states. Less than 5% of the units that were formed in Wisconsin during the 5-year period were discontinued and not a single MUS-E with an IIC has reverted to a prior pattern. The MUS-E is judged to be sound conceptually and economically attractive so as to become functional under a wide variety of school conditions.

The organizational-administrative specifications related to specialization of tasks, cooperative planning and open communication among teachers and administrators, decision making at appropriate levels in the school system, non-grading of students, and related phenomena have been attained. Higher student achievement is occurring where the curriculum component in reading has been incorporated into smooth functioning MUS-Es. IGE practices in early I & R units generally resulted in dramatic increases in student achievement over a short time interval. By 1974-1975 the children who entered Kindergartens of the first MUS-Es will be completing their seventh year of schooling. By 1975 some will have experienced individual programming in reading and other curriculum areas for most of their elementary school years. More definitive answers regarding student achievements and other characteristics will be available at that time.

Table 5

RESULTS IN VARIOUS CURRICULUM AREAS FROM REPRESENTATIVE I & R UNITS 1965-67 SCHOOL YEARS

Subject Matter or Other Area	Description of Development or Research Activity	No./Characteristics of Children	Major Outcome(s)	*Technical Report Number
Mathematics	Results of diagnostic testing on mathematics concepts were used to place children in ad hoc instructional groups for successive 1 to 3 week periods.	96/predominantly Spanish-American/inner city	Approximately 12 months behind in mathematics achievement initially, experimental children made 5 months' gains on a standardized test in a 6-month period.	46
Spelling	Commercial individualized, local individualized, and traditional spelling programs were compared.	150	In School 1, experimental groups in a 7-month interval made from 12 to 14 months' gain on standardized tests; in School 2 the average gain for all groups was 18 months.	45, 35
Handwriting	Commercial and locally developed individualized approach to handwriting instruction were contrasted with traditional methods.	165	All groups, except traditionally taught students in the fifth year of school, including Kindergarten, performed better than did a statewide sample of 4th Graders.	52
Reading	Children were motivated to increase independent outside reading through the use of token rewards and individual conferences.	72/inner city	72 students who had formerly done little independent reading collectively read 2074 books during an 8-month period.	52
Reading	A non-graded scope and sequence of the reading curriculum was prepared and implementation begun at all grade levels.	400	Children toward the end of the second year of school performed at the 2.4 and 2.5 grade equivalents in vocabulary and comprehension respectively; children in the third year of school in a 6-month period made grade equivalent gains of 12 to 19 months in the same areas.	48
Home-School Contacts	A comprehensive home school program involved parents in the child's learning program, and in school social events.	57/inner city	Achievement of experimental pupils was significantly higher than that of control pupils on standardized tests.	52

*The number refers to a Technical Report of the Center. Results of experiments and development-evaluation studies are incorporated in Technical Reports No. 19, 1967; 35, 1967; 45, 1968; 46, 1968; 48, 1968; 52, 1968; 61, 1968; 76, 1969; 89, 1969; 123, 1970; 125, 1970; 142, 1970.